1996

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Economic Research Institute Study Paper

ERI #96-23

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July 1996

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ABSTRACT

Evidence of strong opposition to wilderness proposals in Utah suggested that the nonmarket value of retaining those areas in multiple-use management might be significant. A contingent value analysis of both supporters and opponents of the two major proposals for wilderness designation in Utah indicated that there existed significant nonmarket willingness to pay on the part of opponents, and that standard contingent valuation practice, which does not explicitly consider these values, could lead to a misestimation of aggregate willingness to pay.

Key words: contingent valuation, wilderness, negative responses

PRESERVATION OR USE: A CONTINGENT VALUATION STUDY OF WILDERNESS DESIGNATION IN UTAH[1]

Introduction

In a recent article in this journal, Lockwood et al. (1994, pp. 145-152) reached the conclusion that the nonmarket willingness to pay for timber harvest in Australia was small relative to preservation values. Further, they stated that, "Whilst this conclusion may not be transferable to other resource allocation uses, particularly where a traditional land use is involved . . . it does suggest that past neglect of such a willingness to pay in contingent valuation surveys and associated BCA . . . is unlikely to have significantly influenced results." Unfortunately, contingent valuation studies have been used in many cases where "traditional" land uses, such as grazing, mining, or mechanized recreation, are significant without the benefit of an examination of the nonmarket value of that land in those traditional uses.

In particular, the designation of wilderness areas in the United States, and in other parts of the world, has been the subject of several such valuation studies (see Walsh et al. 1990, for a list of studies of wilderness valuation). Wilderness designation limits nonwilderness recreational uses and may be perceived as constraining more traditional extractive activities. The designation of new wilderness areas in Utah has become a very sensitive political issue, in which supporters and opponents appear to have become polarized. Several alternative proposals have been made, ranging from the Utah Wilderness Alliance proposal, for over 5 million acres of wilderness, to proposals by Utah congressional representatives, for less than 1 million acres, as well as some

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[1]Forthcoming in *Ecological Economics*.

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unofficial calls for the elimination of existing wilderness. Attempts to reach a consensus have not been fruitful, possibly because of the absence of Pareto-relevant trade-offs among the opposed groups (see, for example, Fawson 1993). In the study reported herein, contingent valuation estimation was made for both support and opposition to wilderness designation.[2] Our objective was to determine whether or not there was a significant willingness to pay among Utah residents to retain public lands in open access multiple use, and to compare that value to the willingness to pay for designation using standard contingent valuation (CV) practices.

Previous Studies and Methodology

As indicated above, Walsh et al. (1990) reported 15 published and unpublished studies of nonmarket valuation of wilderness, based on both travel cost and contingent valuation methodologies. In the first published work on wilderness values, Walsh et al. (1984) examined the willingness to pay of Colorado wilderness users for the designation of 10 million acres of wilderness area in Colorado. A mail questionnaire was used with open-ended contingent valuation questions in an attempt to obtain use and nonuse values. The mean willingness to pay was $22.60 for nonuse values and $23.23 for use values.

The only published study of the value of expansions of wilderness in Utah to state residents was reported by Pope and Jones (1990). This study focused on willingness to pay for increasing amounts of wilderness in Utah (specified only as 5, 10, 15, and 20 percent increases in land area) and used a telephone survey with an open-ended form of contingent valuation.

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[2]There exists a large literature regarding the use of contingent valuation for nonmarket goods, including both criticisms of and support for the method [in particular, see Hauseman (1993, pp. 87-89), which includes an exchange between Diamond and Carson, and recent articles by Diamond and Hauseman (1994) and Hanemann (1994)]. Lockwood et al. (1994) give a concise description of the contingent value methodology.

Alternative lead-in information was provided about the average willingness to pay to test the effect of information about the willingness to pay of others on the values elicited. Pope and Jones found a mean willingness to pay for wilderness designation which grew from about $50 for the 5 percent to $92 for the 20 percent increase in the land area. Their statistical estimation of aggregate willingness to pay indicated a declining marginal willingness to pay for wilderness, which would be consistent with declining marginal utility.

The contingent value questions used in all of the wilderness studies cited by Walsh et al. (1990), in Pope and Jones, and in other unpublished studies using contingent valuation, did not allow the respondent to provide a negative bid. Those who were opposed to the hypothetical alternative, which was being evaluated, could only respond with a zero bid (open-ended or payment card CV) or negatively to the bid presented (referendum CV). While Hanemann (1984, 1989) has pointed out that the referendum approach using specific utility function assumptions can account for negative bids in the calculation of the mean or median willingness to pay, no comparison of that calculation with elicited negative bids has been made to our knowledge.

Wilderness Study

In order to examine the value to Utah residents of the designation of the proposed additional wilderness or the retention of that land in open-access multiple-use management, a contingent valuation study was undertaken. A random sample of 2,135 listed telephone numbers was obtained from Survey Research, Inc., Arlington, Virginia, of which 1,263 were contacted between May 1 and June 15, 1993. Although the lack of unlisted numbers has been suggested as a possible source for bias, the percentage of unlisted numbers in Utah is quite small (less that 1

percent), and the fact that information would be mailed to each respondent prior to telephone contact necessitated the use of listed numbers.

Respondents were provided detailed information about the existing wilderness areas in Utah and the two main wilderness proposals: the 1.9 million acres proposed by the Bureau of Land Management (BLM), and the 5.3 million acres proposed by the Utah Wilderness Alliance (UWA). Each identified household was sent a colored map with the specific proposed additions to wilderness identified by color, name, and number and a brief discussion of the management constraints which wilderness designation entails. Specifically, the most recent wilderness legislation in the states surrounding Utah was cited, in which on-going extractive uses, such as grazing and mining, cannot be reduced as a result of wilderness designation, nor can historical methods of operation and maintenance (including motorized and mechanized means) be eliminated. However, no mechanically based recreation (such as bicycling or four-wheeling) is permitted.

In addition, a letter was included, which contained a brief description of the study. The letter indicated that the household would be contacted by telephone to answer some questions about their attitude toward the proposed designations, and their willingness to pay for the designation of those areas as wilderness or for the retention of those areas in multiple use. The interview was carried out with the member of the household over 18 years of age who had most recently had a birthday in order to assure randomness. Once identified, the respondent was asked whether or not he or she had received the packet, and, if so, was the packet immediately available. If not, the interview was terminated, a new packet was mailed, and the respondent was recontacted within two weeks of the mailing.

A computerized telephone questionnaire was developed which included information regarding the respondent's outdoor recreation and wilderness visitation during the past three years, several attitudinal questions, and a sequence of bifurcated question paths which depended on the respondent's attitude (favorable or unfavorable) toward each of the wilderness proposals. Specifically, the respondent was asked to rank his or her attitude using a 1-to-10 scale, with a score of 1 indicating strong opposition, a score of 5 being neutral, and a score of 10 indicating strong support. First, this attitudinal question was posed for the BLM proposal, and, after responses to willingness-to-pay questions were obtained for that proposal, the attitudinal question was again posed with respect to the UWA proposal. All respondents with a score of 5 or above were classified as "supporting" the specific wilderness designation; those with scores of 4 or less were classified as "opponents" of the specific designation.

For each proposal, two contingent valuation questions were posed. For supporters, the first question considered the designation (establishment) of the wilderness area and was structured to include Randall's (1991) total value (use, option, and existence values). The subsequent question asked the willingness to pay to use the areas as wilderness (use value). Those opposed to designation were asked identical contingent valuation questions about, first, the retention of those same proposed areas in open-access multiple use (that is, the nondesignation), and, second, the use of the areas in "open-access" multiple use. "Open-access multiple use" was defined in both the written material and in the telephone survey as management, which could include increases in traditional extractive uses, such as grazing, mining, timber harvest, etc., as well as the use of mechanical means of extraction or recreation. Again, the former question should elicit total values, where the second should be the use value. While, in one sense, the "good" differs

between the two cases (that is, the uses of those areas change with designation), our focus was on the value of the areas themselves in alternative management.

There continues to be debate in the literature as to the best contingent valuation method. Some researchers suggest that open-ended questions are subject to various forms of bias and that dichotomous choice questions may eliminate most of the bias resulting for the form of the open-ended questions (for example, U.S. Department of Commerce 1993; Hanemann 1994); others conclude that the open-ended format provides more accurate estimations (see, for example, discussion in Freeman 1992; Schulze 1993) or that there is a significant anchoring bias in referendum approaches (Green et al. 1995). We used the referendum approach following the U.S. Department of Commerce recommendations.

The establishment (total value) question for supporters asked if he or she would vote for or against designation if it meant a specified annual loss of household income.[3] The same format was applied to the opponents, in that the retention of those lands in open-access multiple use would entail the specified annual loss in household income. The response, however, was the individual's reaction rather than being representative of the household. The annual cost of a use permit was used for the second question in each case.

The bid values were selected on the basis of previous studies (Walsh et al. 1990; Pope and Jones 1990) as well as on a pretest, which included several Utah State University faculty and students and a small nonrandom selection from the general population. The values ranged from $2,000 to $10, and were selected randomly by the computer program for each question.

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[3]The use of an unspecified loss of household income should avoid the "free rider" aspect of a tax or contribution to a fund, although it may have resulted in added hypothetical bias.

For those respondents who indicated that they were not willing to forego the income or pay for a permit, a series of questions was asked to determine if that refusal was a result of a market response ("It is not worth it to me" or "I can't afford it") or a protest bid ("I shouldn't have to pay," "Wilderness should—or should not—be provided without payment," "I refuse to participate," or some other response which indicated protest).

Results

The response rate for the telephone survey was approximately 56 percent (711 respondents of the 1,263 contacted). This rate is consistent with current response rates being obtained in other studies in Utah using telephone interview techniques. The response rates have fallen quite drastically over the past five years as commercial interviewing by telephone has increased. An examination of the socioeconomic characteristics of the respondents indicated that the sample was statistically similar to the general population in Utah.

Results from the logit estimations for all nonprotest bids for the establishment or retention questions are listed in Table 1 for both the BLM and UWA proposals. Use values for both groups of respondents are found in Table 2. Note that the number of supporters fell (and, of course, the number of opponents rose) between the two alternatives. Note also that the number of observations differed from the total number of contacts. This resulted from respondents who did not complete the entire questionnaire or who gave responses classified as "protest." Finally, the percentage of protest responses (particularly the "I should not have to pay" or "wilderness should be provided—or not—without payment" responses) was somewhat higher than found in other studies (30 percent for the supporters of wilderness and 40 percent for opponents). These

relatively frequent protest responses are likely the result of the polarization of supporters and opponents in the wilderness debate which has developed in the state.

In general, the bid coefficients were significant at least at the 10 percent level and of the expected sign. Frequently, however, the intercept values were not statistically significant. Several socioeconomic characteristics were included as explanatory variables in alternative model specifications, and none were consistently significant.[4] The income variable was the most consistent and its coefficients are reported in the tables. The use of household, rather than personal, income reduction may have resulted in lower significance for the variable than has been found in other studies, since the income loss would be "shared" in some sense. With the exception of the opponents of the UWA proposal and the use values for "open access" multiple use, either the intercept or the income variable were "reasonably" significant (although not necessarily at the 10 percent level).

The estimated mean individual willingness to pay for each group in each alternative was calculated using the linear model proposed by Hanemann (1989, p. 1059, equation 11) for which no negative bids are admitted, and is found in Table 3, along with the confidence intervals calculated using the bootstrap method outlined by Cooper (1994).[5] Hanemann observes that these estimates unambiguously overstate the willingness to pay, since the use of the linear model for the statistical estimation does allow for a part of the cumulative density function to lie in the

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[4]Education level was highly correlated with income, as is usually the case, and was used instead of the income variable, with similar results. An examination of the socioeconomic variables (age, household income, and education) indicated consistency with the demographic characteristics of the sampled population for both mean and standard deviations.

[5]Sutherland and Walsh (1985) found that local residents' values for the preservation of water quality made up only about 20 percent of the total value. The values presented in Table 3 represent only those values for the sampled Utah population and should not be applied to the national population.

negative quadrant. It should be noted that the results for the bid coefficient of the opponents to the establishment of the UWA proposal are inconsistent (the coefficient for the bid variable is positive) insignificant, and the calculated willingness to pay is not reliable. There is a statistically distinct order of magnitude difference between the willingness to pay related to the establishment of wilderness for those supporting and those opposing the BLM wilderness designation, with the estimated willingness to pay for retaining lands in multiple being the larger of the two. The use values are similar between opponents and supporters. There is a statistically different willingness to pay for use between supporters and opponents of the UWA proposal, again with opponents having a larger value.

The calculated mean individual willingness-to-pay values were weighted by the sample proportions in order to obtain a weighted average individual willingness to pay. The weighted value of wilderness designation for the BLM proposal is -$168.57. The weighted mean individual willingness to pay for the use of the areas in the BLM proposal is $77.68; and for the use of the UWA areas, $2.18. Although the mean WTP for use of wilderness by supporters increases between the BLM and the UWA proposals, the weighted value for use declines because the increasing willingness to pay for wilderness use is offset by the declining number of supporters and an increase in the willingness to pay for multiple use.[6]

In order to simulate the values generated by the approach most often reported in literature (that is, simply asking all respondents about their willingness to pay for wilderness designation), the two groups of respondents (opponents and supporters) were combined. We assumed that the

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[6]Standard practice would be to use these mean willingness-to-pay values, and multiply by the number of individuals in the state or nation. Since a reduction in household income was used as the "price" variable, such an aggregation would have to be adjusted to represent household income per capita foregone.

random "price" generated by the computer program for opponents would have been the amount which would have been presented, but that each opponent would have answered negatively (not willing to pay) to the dichotomous choice question. The logit estimations were completed for this set of observations and are reported in Tables 4 and 5. The calculated willingness to pay for each alternative, and the related confidence intervals, are reported in Table 6. This value is calculated using the formula admitting negative bids (Hanemann 1989, p. 1058, equation 4'). For the BLM use value, the estimated willingness to pay is quite close to the weighted average of the bids of the two groups. The other two estimates differ substantially, although the confidence interval for the combined sample is relatively large. The combined sample generates calculated estimates, which are more negative than the weighted average,[7] and, therefore, underestimate the value of wilderness.

One other issue arises in this examination. Should the values of those opposed to wilderness be included in their entirety in a benefit/cost or a compensation test? As Lockwood et al. (1994) correctly pointed out, economic stability (in the form of income or jobs), which are implicitly valued in a response, should be deducted from a benefit estimate. Note that any increase in economic activity considered by supporters as a benefit should also be deducted. While job or income loss may appear to be a possible reason for the large values calculated for the opponents to wilderness, respondents were informed that no change would be expected in the traditional extractive uses of the wilderness areas. Thus, these values may represent a possible option value for future development on these public lands, an existence value, or a recreation

[7]Hanemann (1989) noted at least two cases in the literature in which the sign of the willingness-to-pay estimate was ignored and positive mean values were reported where the calculations should have been negative. Ignoring the signs of the combined sample estimates would result in significant overstatement of value in our case.

value. We did not include a question to separate job- and income-related losses from other values, so that if opponents did not believe the information presented, we were unable to separate economic stability values from their nonmarket values. If we use the Lockwood et al. (1994) results, in which approximately 70 percent of total value came from economic stability considerations, then the values of opponents would be reduced to a mean of approximately $754 for the retention of BLM areas in open-access multiple use, $71 for use of the BLM areas in open-access multiple use, and $118 for open-access use of UWA proposed areas. The weighted average would be about $319 for establishment of the BLM areas, $123 for the use of the BLM areas, and $110 for use of the UWA areas. Thus, the weighted average willingness to pay would be more seriously underestimated by the typical CVM approach. Whether the direction of misestimation is consistent for all applications is uncertain. It seems to us that the results which derive from the standard approach to contingent valuation (that is, no examination of the opposition), may overstate or understate willingness to pay.

Summary and Conclusion

Current debate in the popular literature, as well as results from other socioeconomic studies, have suggested that, among the Utah population at least, there is significant opposition to the designation of either the BLM or the UWA wilderness proposals. Our results are consistent with that polarization of opinion, and they appear to suggest that, at least in cases in which there exists evidence of strong opposition to a proposed action, which may involve nonmarket considerations, contingent valuation studies, which do not take that opposition specifically into account, may generate inaccurate values and, consequently, mislead public decision makers.

Acknowledgements

The authors wish to thank Dr. Quinn Weninger, Utah State University, for his comments and aid, and three anonymous referees, for their comments on previous versions of this manuscript. Any remaining errors are solely our responsibility.

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Table 1. Logit Estimation Results for Establishment of BLM and UWA Wilderness Areas (t values in parentheses)[a]

	Total Responses/ Nonprotest Observations	Intercept	Bid Coefficient	Income Coefficient
BLM support	449/316	0.3405 (1.18)*	-0.00119 (-5.29)****	-0.0029 (-0.05)
BLM oppose	221/121	0.0405 (0.09)	-0.00047 (-1.63)*	0.166 (1.78)**
UWA support	397/283	0.3228 (1.06)	-0.00209 (-5.54)****	0.072 (1.11)
UWA oppose	302/181	0.1861 (0.52)	0.0001 (0.38)	0.0655 (0.90)

[a]The logit model estimates the probability of a respondent being willing to pay as a function of the bid value and household income.

*Indicates significance at the .20 level.
**Indicates significance at the .10 level.
***Indicates significance at the .05 level.
****Indicates significance at the .01 level.

Table 2. Logit Estimations for Use of BLM and UWA Wilderness Areas (t values in parentheses)

	Total Responses/ Nonprotest Observations	Intercept	Bid Coefficient	Income Coefficient
BLM support	449/316	1.7906 (4.74)****	-0.00898 (-7.21)****	-0.0468 (-0.66)
BLM oppose	221/121	0.3166 (0.70)	-0.00435 (-3.61)****	0.061 (0.68)
UWA support	397/283	1.5724 (4.53)****	-0.00565 (-6.72)****	-0.096 (1.41)*
UWA oppose	302/181	0.1866 (0.52)	-0.00219 (-3.47)****	0.0299 (0.41)

*Indicates significance at the .20 level.
**Indicates significance at the .10 level.
***Indicates significance at the .05 level.
****Indicates significance at the .01 level.

Table 3. Calculated Mean Willingness to Pay for BLM and UWA Wilderness Areas With Confidence Intervals*

	Establishment (Total Value)	Use
	$	$
BLM support	729.41 (568-842)	197.84 (173-216)
BLM oppose	2,513.69 (1,224-15,974)	236.13 (197-293)
UWA support	497.60 (392-556)	254.85 (202-281)
UWA oppose	Not significant	394.32 (267-521)

*Values in parentheses reflect a 90 percent confidence interval obtained from boostrapping.

Table 4. Logit Estimation Results for Establishment of BLM and UWA Wilderness Areas With Combined Data (t values in parentheses)

	Total Responses/ Nonprotest Observations	Intercept	Bid Coefficient	Income Coefficient
BLM	437	-0.267 (-1.06)	-0.0010 (-4.82)****	-0.0104 (-0.21)
UWA	464	-0.455 (-1.85)**	-0.0016 (-5.06)****	0.0116 (0.23)

*Indicates significance at the .20 level.
**Indicates significance at the .10 level.
***Indicates significance at the .05 level.
****Indicates significance at the .01 level.

Table 5. Logit Estimation Results for Use of BLM and UWA Wilderness Areas With Combined Data (t values in parentheses)

	Total Responses/ Nonprotest Observations	Intercept	Bid Coefficient	Income Coefficient
BLM	437	0.5933 (2.16)***	-0.0065 (-6.63)****	-0.0310 (-0.58)
UWA	464	0.236 (0.94)	-0.0043 (-5.86)****	-0.0772 (-1.4)*

*Indicates significance at the .20 level.
**Indicates significance at the .10 level.
***Indicates significance at the .05 level.
****Indicates significance at the .01 level.

Table 6. Calculated Mean Willingness to Pay for BLM and UWA Wilderness Areas With Combined Data (with confidence intervals*) and Comparison with Weighted Averages

	Establishment (Total Value)		Use	
	Combined Sample	Weighted Average	Combined Sample	Weighted Average
	$	$	$	$
BLM	-308.01 (-534 to -55)	-160.36	70.81 (31 to 104)	77.80
UWA	-257.82 (-436 to -102)	not significant	-21.16 (-63 to 39)	1.61

*Values in parentheses reflect a 90 percent confidence interval obtained from boostrapping.